Charge Trail

Use test evidence to compare how charge behaves in different materials.

S8P5.b "Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each action that makes an investigation fair, and circle each observation that would show where charge is located.

Following Charge Evidence

1. Static charge can be investigated with simple materials. A student places a clean aluminum can on a dry plastic tray so the can is insulated from the table. She rubs a balloon with wool, then holds the balloon near the can without touching it. Electrons in the metal can move. They shift away from the balloon, leaving the side nearest the balloon relatively positive and the far side relatively negative. This separation is called induction. The can may roll toward the balloon because opposite charges are closer together.

2. To test whether charge spreads through a conductor, the student repeats the setup after touching the charged balloon to the can. She uses small paper bits as charge detectors. First, she brings a paper bit near the point where the balloon touched. Next, she tests a point on the opposite side. She keeps the balloon, rubbing method, distance, and paper bits the same. If both locations attract paper bits, the evidence supports charge spreading over the outside surface of the metal can.

3. An insulator behaves differently because its electrons are not free to move through the material. For comparison, the student rubs a plastic strip with wool and touches the strip at one marked spot. She tests paper bits near that spot and near a second marked spot far away. She uses a new, uncharged strip for each trial and records observations in a data table. Attraction mainly near the touched spot would show that charge stays localized on the insulator. Repeating trials makes the conclusion more reliable.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the student place the aluminum can on a dry plastic tray?

2. After the balloon touches the can, which two locations does the student test, and what result would support charge spreading?

3. Name two conditions the student keeps the same during the can investigation. Why is keeping conditions the same useful?

4. What paper-bit result on the plastic strip would support the claim that charge stays localized on an insulator?

3 YOUR TURN

Your own words

Complete the table to plan a fair comparison of charge distribution on a metal pie pan and a plastic lid. Use a charged balloon, two test locations on each object, and paper bits as detectors.

OBJECT	HOW IT IS CHARGED AND ISOLATED	TWO TEST LOCATIONS	PREDICTED RESULT AND CONSTANT CONDITIONS

ANSWER KEY

Charge Trail

GRADE 8 · S8P5.b

PART 1 · READ AND MARK

Underline each action that makes an investigation fair, and circle each observation that would show where charge is located. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the student place the aluminum can on a dry plastic tray?	**The plastic tray insulates the can from the table.**
2	After the balloon touches the can, which two locations does the student test, and what result would support charge spreading?	**She tests the contact point and a point on the opposite side. Attraction of paper bits at both locations supports charge spreading over the can.**
3	Name two conditions the student keeps the same during the can investigation. Why is keeping conditions the same useful?	**Any two: the balloon, rubbing method, distance, or paper bits. Keeping them the same makes the test fair so location is the important difference.**
4	What paper-bit result on the plastic strip would support the claim that charge stays localized on an insulator?	**Paper bits would be attracted mainly near the touched spot, not near the far marked spot. This supports localized charge on the plastic strip.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

OBJECT	HOW IT IS CHARGED AND ISOLATED	TWO TEST LOCATIONS	PREDICTED RESULT AND CONSTANT CONDITIONS
Metal pie pan	Rub balloon with wool, touch pan, and rest pan on an upside-down plastic cup	Near contact point and opposite edge	Paper bits should be attracted at both locations. Use the same balloon, rubbing method, distance, and paper bits.
Plastic lid	Rub balloon with wool, touch lid, and rest lid on an upside-down plastic cup	Near contact point and opposite edge	Paper bits should be attracted mainly near the contact point. Use the same balloon, rubbing method, distance, and paper bits.

Accept equivalent descriptions of insulation, fair-test controls, and detector observations. For the open task, accept any safe plan that compares a conductor and an insulator at two locations while holding key conditions constant.